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POLY-PHENYLENE-QUINONEDIIMINE AS A POSSIBLE CONDUCTING  
LIQUID CRYSTAL(U) ARIZONA UNIV TUCSON DEPT OF CHEMISTRY  
H K HALL 30 JUN 86 IR-5 NO 0014-83-K-0376

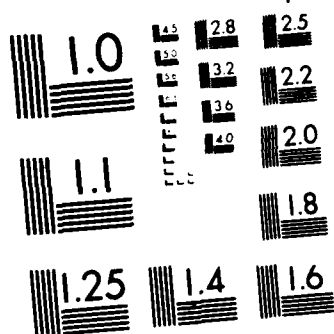
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OFFICE OF NAVAL RESEARCH

PUBLICATIONS / PATENTS / PRESENTATIONS / HONORS REPORT

for

1 July 1985 through 30 June 1986

Technical Report Number 5

for

Contract N 00014-83-K-0376

Task No. NR 356-844

Poly-phenylene-quinonediimine as a Possible Conducting Liquid Crystal

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Part 1.

- a. Yen-Yuan Chen and H. K. Hall, Jr., "Polycondensation of Squaric Acid with N-Alkylcarbazoles," Polymer Bulletin, submitted.
- b. i) Anne B. Padias and H. K. Hall, Jr., "The High Temperature Free Radical Polymerization of Multinitriles," J. Polym. Sci., Polym. Chem. Ed. 24, 1675 (1986).  
ii) A. Everaerts, Sue Roberts and H. K. Hall, Jr., "Synthesis and Properties of Semiconducting Aromatic Polyquinonediimines," J. Polym. Sci., Polym. Chem. Ed., 24, 1703 (1986).
- c-1) Not Applicable.

c. Description

The synthesis of stable electrically conducting, fabricable polymers of known structure represents an important goal of current polymer science. It seems to us that conductive, processable, and stable materials of defined structure should not be beyond the reach of the modern synthetic polymer chemist.

Our approach has been to utilize a wide variety of polycondensation reactions to see whether they are useful for the synthesis of potentially conducting, stable, processable polymers. Polycondensation routes are preferred because they will lead to polymers of rational, known structure. Standard techniques of polymer chemistry such as copolymerization, use of unsymmetrical monomers, and introduction of "softening" substituents can be used to enhance processability. Further, the extended para structures preferred for conductivity may also lead to liquid crystal behavior, another potential tool for fabrication.

Keywords:  
polymers,  
synthesis (chem)  
AN

①.

We have chosen condensation polymers containing nitrogen in the main chain as the focus of our work. Aniline Black is the prototype of conducting nitrogen-containing polymers. This nitrogen is expected to be useful as a handle for processing and doping as well as aiding in the synthesis of these new conjugated polymers.

d. Significant Results

1. We synthesized two new families of multiazopolyanil esters and formals. Diphenols containing from one to three p-phenyleneazo links were synthesized by organic chemistry methods and condensed with diacid chlorides or with methylene chloride. Liquid crystal behavior was observed for several of these polymers.

The polymers were found to be moderately electron-accepting (n-type). No p-type conduction could be found by doping with iodine (T. Kuo).

2. Highly branched "starburst" aromatic polyamines were synthesized by repetitive condensation reactions. They were doped with iodine to form semiconducting materials (D. Polis).

3. Condensation of N-ethylcarbazols with diethyl squarate and squaryl dichloride gave a new class of condensation polymers.

These were not conductive even when doped with iodine (Yen Chen).

e. Brief Plans

We plan to synthesize polymers consisting solely of p-phenyleneazo links by oxidative coupling of aromatic amines (T. Kuo).

Work on "starburst" polymers will be continued using aliphatic nitro compounds for greater reactivity (D. Polis).

Our anthraquinone polyimine work will be extended to other types of quinones (Dr. Yen Chen).

Nitrenium ion polymerization will be examined as a route to poly-aromatic amines (Dr. Yen Chen).

Part 2.

a. Expended:

	Salaries	Operations	Travel	Capital	Total
10/1/85 to					
8/31/86	34,611.21	9,696.33	593.00	9,846.38	54,746.92
Budget:	38,108.00	6,515.00	800.00	5,500.00	50,923.00

b. Current telephone number: (602) 621-6325/6326

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